CEU COURSE DESCRIPTION

CHLORINATION 202 CEU TRAINING COURSE – 20 Hours

Chlorination has been proven to be very effective against bacteria and viruses. However, it cannot disinfect all waterborne pathogens. Certain pathogens, namely protozoan cysts, are resistant to the effects of chlorine. This course will focus upon gaseous and liquid form of chlorine (Cl_2) which is a water additive used by municipal water systems to control microbes. It is relatively inexpensive and has the lowest production and operating costs and longest history for large continuous disinfection operations. Chlorine is a powerful oxidant.

Course Purpose

The main purpose of this course is to provide twenty hours of continuing education in understanding various chlorination methods for disinfecting water. Unlike some of the other disinfection methods like ozonation and ultraviolet radiation, conventional chlorination is able to provide a residual to reduce the chance of pathogen regrowth in water storage tanks or within the water distribution system. At times, distribution systems can be a fair distance from the storage tanks and in dead end sections or where water is not used pathogens may re-grow if a proper (chlorine) residual is cannot be maintained in the treated water sent out for consumption. This results in poor water quality as well as slime and biofilms in the distribution systems that will end up contaminating the clean, treated water being distributed. We will also cover chlorination for wastewater treatment, onsite and general laboratory disinfection – bacteriological procedures.

Target Audience

The target audience for this course includes water distribution workers, well drillers, pump installers, water treatment operators, wastewater operators and onsite operators who need to disinfect septic related wastewaters. Also included are people interested in working in a water treatment/wastewater treatment or distribution facility and/or wishing to maintain CEUs for a certification license or to learn how to perform their job safely and effectively, and/or to meet education needs for promotion. There are no prerequisites, and no other materials are needed for this course.

Course Statement of Need

All water and wastewater operators need to be able to describe chlorination procedures and properly demonstrate proper and safe operation of various disinfectants for water and wastewater treatment.

General Learning Objectives

At the conclusion of the class, each participant will take a written examination and complete a course evaluation. Participants will have the opportunity to acquire knowledge of the following concepts.

Primary Overall Learning Course Goals and Timed Outcomes

1. Understand and describe Safe Drinking Water Act (SDWA). 30 minutes
2. Understand and describe various conventional modern water/wastewater treatment disinfectants. 160 minutes
3. Understand and describe various halogens and halides. 25 minutes
4. Understand and describe the history of chlorination. 10 minutes
5. Understand and describe waterborne diseases and viruses. 170 minutes
6. Understand and describe chlorine gas.150 minutes

7. Understand and describe various chlorine basics. 200 minutes
8. Understand and describe chlorine exposure limits, residuals and related information. 10 minutes
9. Understand and describe sodium hypochlorite. 20 minutes
10. Understand and describe calcium hypochlorite. 20 minutes
11. Understand and describe chlorine-based disinfectants- Chloramines, and related oxidizers. 20 minutes
12. Understand and describe chlorination equipment and safety requirements. 30 minutes
13. Understand and describe chlorine health hazards. 20 minutes
14. Understand and describe chlorine dioxide. 20 minutes
15. Understand and describe water/wastewater/onsite disinfection methods. 160 minutes
16. Understand and describe alternative chlorination methods for water/wastewater disinfection. 30 minutes
17. Understand and describe various and conventional bacteriological sampling and monitoring. 200 minutes

Detailed Learning Objectives

1. Understand and describe Safe Drinking Water Act (SDWA).

Adverse Effects
Assimilable Organic Carbon (AOC)
Bacteria
Bromate
Chlorine Disinfectants/Disinfectant By-Products (DBPs)
Chlorine v. Chloramine
Current EPA Research –Barriers to Contamination
Disinfection Byproduct Regulations
Disinfection Rules
EPANET
Haloacetic Acids (HAA5)
Microbial Regulations
NDMA
Protozoa
Protozoan Diseases
Risks and Benefits of Chlorine
Stage 1 DBP Rule
Stage 2 DBP Rule
THM Treatment
Total Trihalomethanes
Understanding Cryptosporidiosis
Understanding Giardia lamblia
Understanding Waterborne Diseases
Viruses
Waterborne Pathogens

2. Understand and describe various conventional modern water/wastewater treatment disinfectants.

Bromate
Chloramine
Chlorine
Chlorine Dioxide
Disinfection Byproducts (DBPS)
Haloacetic Acids
Total Trihalomethanes

3. Understand and describe various halogens and halides.

Bromine
Chlorine
Fluorine
Iodine

4. Understand and describe the history of chlorination.

Chlorine Timeline
Chlorine Supplement Pre-Quiz
Chlorination Introduction
Drawbacks to Water Chlorination

5. Understand and describe waterborne diseases and viruses.

Campylobacter
Cryptosporidium
Cryptosporidium and Giardia Analysis
Disinfection of Water and Wastewater
E-Coli Section
Emerging Pathogens
Giardia
Ground-Water Sample Collection
Hepatitis A
Legionella
Microscopic Waterborne Agents
Norovirus
Pseudomonas
Salmonella species
Salmonella Typhi
Sampling Procedures
Schistosomatidae
Shigella Species
Streamwater Sample Collection
Understanding Bacteria
Understanding Bacteriophage
Understanding Oxidizing Agents
Understanding Protozoan Parasites
Understanding Viruses
Vibrio Cholerae
Virions
Waterborne Pathogens

6. Understand and describe chlorine gas.

Chlorine Exposure Limits
Chlorine's Appearance and Odor
Disinfection Essentials
Early Response to Chlorine Gas
Mechanism of Activity
Pathophysiology
Reactivity
Solubility Effects

7. Understand and describe various chlorine basics.

Chlorine's Effectiveness
Oxidation Chemistry
Understanding Disinfection
Wastewater Disinfection
Water Disinfection
Residual Disinfection
Chlorate Ion
Chloride Ion
Hypochlorites
Disinfection Byproducts
Trihalomethanes (THM)
Haloacetic Acids (HAA5)
Chloroform
Sodium Chlorate
Chemical Oxygen Generation
The Benefits of Chlorine
Potent Germicide
Taste and Odor Control
Biological Growth Control
Chemical Control
Water Treatment
Water Distribution
The Challenge of Disinfection Byproducts
Understanding Disinfection Byproducts
Chemistry of Chlorination
Chlorine Review
Chlorine Demand
Chlorine Residual

8. Understand and describe chlorine exposure limits, residuals and related information.

Ammonia
Amperometric Titration
Breakpoint chlorination
Chlorine Dose, Demand, and Residual
Chlorine Residual Reagents
Combined Chlorine Residual
CT and Log Inactivation Calculation
DPD Colorimetric Method
Free Chlorine
Iodometric and Amperometric Methods:

Iodometric Method
Log Inactivation
Onsite Hypochlorite Generation
Post-chlorination
Pre-chlorination
Preparation of Chemicals
Test Methods Available for Residual
Total Chlorine Residual
Calculation and Reporting of CT Data
Understanding Chlorine Demand
Understanding Combined Chlorine Residual

9. Understand and describe sodium hypochlorite.

Effectiveness of Shock Chlorination
Incompatibilities
Applications of Sodium Hypochlorite
Inhalation
Recommendations for Preparing/Handling/Feeding
Routes of Exposure
Salt Electrolysis System
Shock Chlorination — Well Maintenance
Sodium Hypochlorite Exposure
Sodium Hypochlorite Solutions
Troubleshooting Hypochlorination Problems

10. Understand and describe calcium hypochlorite.

Comparison
Corrosion
Effectiveness
Safety
Storage and Distribution

11. Understand and describe chlorine-based disinfectants- Chloramines, and related oxidizers.

Chloramine Advantages
Chloramine Disadvantages
Chloramine Section
Dichloramine
Monochloramine
Oxidizing Agents
Phenolics
Quaternary Ammonium Compounds
Silver
Trichloramine
Trichloroisocyanuric Acid

12. Understand and describe chlorination equipment and safety requirements.

Access
Capacity
Chlorine Leak Detection
Chlorine Room Design Requirements
Heating
Methods of Control
Safety Equipment
Scrubbers
Securing Cylinders
Standby Provision
Storage of Chlorine Cylinders
Ventilation
Weigh Scales

13. Understand and describe chlorine health hazards.

ABC Reminders
Victim Removal
Decontamination Zone
Rescuer Protection
ABC Reminders
Basic Decontamination
Transfer to Support Zone
Support Zone
ABC Reminders
Additional Decontamination
Advanced Treatment
Transport to Medical Facility
Multi-Casualty Triage
Routes of Exposure
Chemical Spill Procedure Example
Chronic
Emergency Medical Procedures
Emergency Response Contingency Plans
Evacuation and Emergency Procedures
Exposure Sources and Control Methods
Eye
Eye/Skin Contact

General Planning Considerations
Ingestion
Inhalation
Leak Procedures
Major Leak
Minor Leak
Pre-hospital Management
Hot Zone
Rescuer Protection
Respiratory Protection
Signs and Symptoms of Exposure

14. Understand and describe chlorine dioxide.

Chlorine Dioxide Advantages
Chlorine Dioxide Disadvantages
First Aid and Treatment
Reactive Chemical Hazards

15. Understand and describe water disinfection methods.

Chemical Methods
Chlorination and Dechlorination
Household Methods
Photo-Inactivation
Physical Methods

16. Understand and describe alternative chlorination methods for water/wastewater disinfection.

Alternate Disinfectants Summary
Chloramines
Chlorine Dioxide
Ozone
Ozone Advantages
Ozone Disadvantages
Ozone Section
Photoelectric Cell
Strongest Oxidizing Agent
Ultraviolet Disinfection
Ultraviolet Radiation Advantages
Ultraviolet Radiation Disadvantages
Unknown Factors Associated with Alternatives

17. Understand and describe various and conventional bacteriological sampling and monitoring.

"Indicator" Organisms
Acute Risk to Health
Fecal Coliforms and E. Coli
Assessment and Corrective Action
Bacteria Sampling
Burkholderia Pseudomallei
Coliform Bacteria
Coliform Testing
Computing and Reporting
Francisella Tularensis
Helicobacter Pylori
Heterotrophic Plate Count
Heterotrophic Plate Count
Laboratory Analysis
Laboratory Procedures
Total Coliforms
Total Coliforms, Fecal Coliforms, E. Coli
Transition to the RTCR
Types of Water Samples
Understanding Bacteria Sampling
Understanding Bacteriological Monitoring
Understanding Coliforms
Level 1 assessment
Level 2 assessment
Maximum Contaminant Levels (MCLs
Method 1604
Method 1605
Method 1605
Method 1623
Mycobacterium
Positive or Coliform Present Results
Proposed Rule Provisions and Rationale
Public Notice
Repeat
Routine
Routine Coliform Sampling
Special
Understanding Positive or Coliform Present Results
Violations and Public Notification

Accreditation Formula for Figuring CEU Credit**
The results of beta testing were used in conjunction with a formula to determine average student time for accreditation purposes for intended audiences. This formula may not work for unintended audiences.

- 1 page of text = 2 minutes of student time.
- 1 word practice problem = 1 minute of student time.
- 1 word quiz/exam question = 1 minute of student time.

**CEU was awarded based on guidelines established by the International Association of Continuing Education and Training (IACET).

Course Page Count Total
1 page of text = 2 minutes of student time.
1 exam question = 1 minute of student time

475 pages times 2 equals 950 divided by 60 minutes =15.8 hours
300 questions equals 5.00 hours
Total time 20.8 hours ***We are asking for 20 hours of credit.***

Specific Course Goals and Timed Outcomes (Beta Testing)
Initial Beta Testing 2005. Chlorination 404, 303, 202, 101 Original Master Course
Twenty students were given a task assignment survey in which to track their times on the above learning objectives (course content) and utilized a multiple-choice style answer sheet to complete their final assignment. All students were given 30 days to complete this assignment and survey. Twenty students were selected for this assignment. Thirteen of the students held water distribution or water treatment operator certification positions, and seven students were wastewater treatment operators. Average completion time for Chlorination 202 was 20.4 hours.

Fourteen out of twenty students were successfully tested. None of the test group received credit for their assignment. Six students failed the final examination. All of the students completed the reading assignment. All of the wastewater treatment operators passed the assignment. The average times were based upon the outcomes of the fourteen students who passed. Rusty Randall, Proctor, February 2005

Second Beta Testing and Course Adjustment
In the subsequent time, fifty water/wastewater operator students were selected to complete the assignment and the completion statistics are as follows: 78 percent passing rate with an overall average score of 82 percent within a 90-day assignment completion period. The primary student response was the assignment was too difficult and too long. The average time necessary to complete each task was recorded as stated in the above objectives and timed outcome section. The tasks were measured using times spent on each specific objective goal and final assignment grading of 70% and higher. The student survey was utilized to work out all problems in the assignment and was utilized for course corrections. Rusty Randall, Proctor, July 2012

Final Conclusion
The average time for the Chlorination 202 course is 20.4 hours with an average score of 78 percent.

Task Analysis and Training Needs Assessment Process Information Gathering
Task Analysis and Training Needs Assessments have been conducted to determine or set Needs-To-Know for the basis of TLC's continuing education courses. The following is a listing of some of those who have conducted extensive valid studies from which TLC has based the continuing education program upon: the Environmental Protection Agency (EPA), the Arizona Department of Environmental Quality (ADEQ), the Texas Commission of Environmental Quality (TCEQ), Pennsylvania Depart of Environmental Protection (PDEP) and the Association of Boards of Certification (ABC).

TLC has primary used Training Provider Manual for the Pennsylvania Water and Wastewater System Operator Training Program for course goal setting and learning objectives for all three training formats; conventional classroom, distance paper based and web based training.

The titles or names of subjects (Learning Objectives) may be changed for readability purposes. Some of the terms used in this document may be part of a copyrighted adult learning assessment process and in these cases, we utilize generic terminology. The needs assessment/survey maintains our training and education materials criteria. Assessments and changes are performed based on changes in technology, evaluations of the students, regulatory changes and editorial corrections. Most of this information is considered intellectual property and may not be owned by TLC but by third –parties. All of TLC's information is proprietary.

ADDIE
TLC utilizes a five-phase instructional design model consisting of Analysis, Design, Development, Implementation, and Evaluation for our continuing education courses. Each course design step has an outcome that feeds into the next step in the sequence. The five phases of ADDIE are as follows:

ANALYSIS
During the Training Needs Assessment Process Information Gathering Analysis phase, the course designer(s)(see Subject Matter Experts and Contributing Editors) identifies the learning need, the goals and objectives, the student's needs, existing knowledge, Course Statement of Need**,** and any other relevant characteristics (State or Federal Need-to-Know) and to ensure that students are learning what is relevant for their job**.**

DESIGN
This is the systematic process of specifying learning objectives from the Training Needs with a focus on Bloom's Taxonomy. A detailed storyboard following the Needs Assessment/Survey and/or Course Statement of Need will determine the course content.

DEVELOPMENT
The actual creation (production) of the training content will begin based upon the Design phase using Bloom's Taxonomy. At this time, a decision is make to proceed or table the course.

IMPLEMENTATION
During implementation, the Alpha testing plan is put into action and a procedure for course and/or assessment revision is implemented. These course materials and assessments are delivered or distributed to the student group. After delivery, the effectiveness of the training materials is evaluated in Beta testing phase. All of our courses have extensive Alpha and Beta testing to ensure job relevancy, correct information and course learning objectives are met.

EVALUATION
This phase consists of (1) formative and (2) summative evaluation from Alpha and Beta testing. Formative evaluation is present in each stage of the ADDIE process. Summative evaluation consists of tests designed for criterion-related referenced items and providing opportunities for feedback from the students and proctor.

Ongoing Course Evaluation: Administrative and instructional staff will collect all student concerns (verbal, written and surveys) and distribute these to TLC Administrative personnel for evaluation and course corrections. Course and/or Assessment revisions are made as necessary.

Precept-Based (Micro-Learning) Training Course
TLC's training courses are based upon a form of induction training, made of topical and technical precepts that are discovered in the Needs Assessment/Survey and/or Training Needs Assessment Process Information Gathering. The training topics or learning objectives are made up of "micro-content" or "precepts"– or small chunks of information that can be easily digested. These bite-size pieces of technical information are considered to be one of the most effective ways of teaching students new or important information (regulatory or technical) because it helps the mind retain knowledge easier.

Micro-learning or precept-based training doesn't rely on the student to process a large amount of information before breaking it down. Our method includes short modules with clearly defined learning goals for each section. This method allows a student to hone in on a particular skill, then given the opportunity to exhibit their knowledge in the final assessment (assignment).

Course Training/Assessment Needs Methodology
Technical Learning College identified training/assessment needs by placing identifying them in two categories; internal and external.

Internal Methods include:
- ✓ Observation
- ✓ Interviews
- ✓ Instruments: Perception instruments and Knowledge based assessments
- ✓ Student records and reports
- ✓ Group problem analysis (Classroom or Seminars)
- ✓ Performance or Survey appraisals

External Methods include:
- ✓ Outside consultants (Completion)
- ✓ Government Certification Reviews (Training Needs)
- ✓ Records and reports from other agencies

The needs assessment/survey maintains our training and education materials criteria. Assessments and course material changes are performed based on changes in technology, evaluations of the participants and regulatory changes. Materials are assessed yearly or as needed to insure course integrity.

Course Author
Melissa Durbin
This course was co-authored by Melissa Durbin; she has over 25 years of wastewater treatment teaching experience as a college instructor. Melissa has written the several nationally accepted wastewater treatment manuals since 2001. This course has been accepted in most States for continuing education credit. Melissa has taught approximately 10,000 students about water/ wastewater treatment, disinfection and related classes. She will be available to answer questions relating this course.

Extensive Academic Research
Technical Learning College's (TLC's) continuing education course material development was based upon several factors; field experience working in the water quality field, extensive academic research (teaching in the community college system), advice from subject matter experts (State officials and industry leaders), data analysis, task analysis and training needs assessment process information gathered from other states.

Both Melissa and Jeff Durbin are the two primary Instructors, Subject Mater Experts and Technical Writers have trained and/or certified more than ten thousand students. These two Instructors teach on a daily basis in a classroom setting throughout Arizona and on-line to students nationwide. See below for more information.

Advice from Subject Matter Experts
Both Melissa and Jeff Durbin are professional trainers and have been educated in current trends in professional education and continuing education needs.

Primary Course Designers Melissa and Jeff Durbin
Melissa Durbin
This course was co-designed by Melissa Durbin; she has over 25 years of teaching water and wastewater treatment experience as a college instructor. Melissa has written the several nationally accepted water and wastewater treatment manuals. Melissa has taught approximately 10,000 students about water and wastewater treatment and related classes. She will be available to answer questions relating this course.

Jeff Durbin
This course was co-designed by Jeff Durbin, over 10 years of water and wastewater treatment experience as a backflow inspector for the City of Phoenix and 20 years of water and wastewater treatment experience. Jeff has taught approximately 10,000 students about water and wastewater treatment primarily in water distribution, and pollution control (water quality) related classes. Jeff will also be able to answer any question pertaining to disinfection or chlorination.

Advice from Subject Matter Experts
Both Melissa and Jeff Durbin are professional trainers and have been educated in current trends in professional education and continuing education needs.

Course Complier
Peter Easterberg, Detail-oriented technical writer/technical editor/desktop publisher/copy editor. 20 years' experience editing and writing feasibility and trade-off studies, test procedures, specifications, user manuals, company policies, HR forms, and ISO-9000 documents. Exceptional grammatical/written communication skills. "Go-to" person for Microsoft Word, Outlook, and general computer questions. Internet Webmaster Certificate (including HTML)

Contributing Editors
James L. Six Received a Bachelor of Science Degree in Civil Engineering from the University of Akron in June of 1976, Registered Professional Engineer in the State of Ohio, Number 45031 (Retired), Class IV Water Supply Operator issued by Ohio EPA, Number WS4-1012914-08, Class II Wastewater Collection System Operator issued by Ohio EPA, Number WC2-1012914-94

Joseph Camerata has a BS in Management with honors (magna cum laude). He retired as a Chemist in 2006 having worked in the field of chemical, environmental, and industrial hygiene sampling and analysis for 40 years. He has been a professional presenter at an EPA analytical conference at the Biosphere in Arizona and a presenter at an AWWA conference in Mesa, Arizona. He also taught safety classes at the Honeywell and City of Phoenix, and is a motivational/inspirational speaker nationally and internationally.

James Bevan, Water Quality Inspector S.M.E. Twenty years of experience in the environmental field dealing with all aspects of water regulations on the federal, state, and local levels. Experience in the water/wastewater industry includes operation of a wastewater facility, industrial pretreatment program compliance sampling, cross-connection control program management, storm water management, industrial and commercial facility inspections, writing inspection reports for industry, and technical reports per EPA permit requirements. Teacher and Proctor in Charge for Backflow Certification Testing at the ASETT Center in Tucson for the past 15 years and possess an Arizona Community College, Special Teaching Certificate in Environmental Studies. Extensive knowledge and experience in college course and assignment/assessment writing.

Dr. Pete Greer S.M.E., Retired biology instructor, chemistry and biological review.

Jack White, Environmental, Health, Safety expert, City of Phoenix. Art Credits

Ongoing Course Evaluation
Administrative and instructional staff will collect all student concerns (verbal, written and surveys) and distribute these to the Course Editor or Copyeditors for evaluation and course corrections. Administrative and instructional staff will collect all student concerns (verbal, written and surveys) and distribute these to TLC Administrative personnel for evaluation and course corrections. Course and/or Assessment revisions are made as necessary.

Editor's Discretion
The Course Editor may change the course assessment (assignment), course text, objective, artwork and topical order as necessary for security, corrective, printing, readability or typesetting purposes. The assessment may be rotated for security purposes and the course material may be updated to reflect any regulatory updates and/or corrections. The overall course objective or topic guide may be in a different order than the course manual for the reason of typesetting or copy-editing purposes. Course materials, charts and artwork amendments, adjustments, modifications may be performed to reflect regulatory/safety text/artwork updates, Bloom's taxonomy changes, error adjustments and comprehension. These changes generally do not reflect major course material changes, but are minor in nature.

Course Procedures for Registration and Support

All of Technical Learning College's distance learning courses have complete registration and support services offered. Delivery of services will include e-mail, web site, telephone, fax and mail support. TLC will attempt immediate and prompt service.

When a student registers for a correspondence course/online course, he/she is assigned a start date and an end date. It is the student's responsibility to note dates for assignments and keep up with the course work. If a student falls behind, he/she must contact TLC and request an end date extension in order to complete the course. It is the prerogative of TLC to decide whether to grant the request. All students will be tracked by a unique computer generated number assigned to the student. Some students will be tracked and reported by their operator ID for required state agencies.

Disclaimer and Security Notice

The student shall understand that it their responsibility to ensure that this CEU course is either approved or accepted in my State for CEU credit. The student shall understand and follow State laws and rules concerning distance learning courses and understand these rules change on a frequent basis and will not hold Technical Learning College responsible for any changes.

The student shall understand that this type of study program deals with dangerous conditions and will not hold Technical Learning College, Technical Learning Consultants, Inc. (TLC) liable for any errors or omissions or advice contained in this CEU education training course or for any violation or injury caused by this CEU education training course material. The student shall contact TLC if they need help or assistance and double-check to ensure my registration page and assignment has been received and graded.

Student's Identity, Attendance, and Participation Verification

A proctoring report and/or computer-tracking program validates proper identity, attendance and participation. The student shall submit a driver's license for signature verification and track their time worked on the assignment. The student shall also sign an affidavit verifying they have not cheated and worked alone on the assignment. We follow up with telephone confirmation and/or quiz review assessment. All student attendance is tracked on TLC's student attendance database.

Teaching Techniques and Assessment Tools

Our training courses are based upon a form of induction training, made of topical and technical precepts. The training topics are made up of "micro-content" or "precepts"– or small chunks of information that can be easily digested. These bite-size pieces of technical information are considered to be one of the most effective ways of teaching people new information because it helps the mind retain knowledge easier. Micro-learning or precept-based training doesn't rely on the student to process a large amount of information before breaking it down. Our method includes short modules with clearly defined learning goals for each section with a post quiz and a final assessment (quiz). This method of pre-quiz allows a student to hone in on a particular skill, then given the opportunity to exhibit their knowledge in the final assessment.

Educational Learning Objective Topics

The CEU course covers several educational topics/functions/purposes/objectives. The topics listed are to assist in determining which educational objective or goal is covered for a specific topic area. This information is available in the detailed beta-testing information and may be found in the course's table of contents. The titles or names of subjects may be changed for readability purposes.

TLC Contact Information
All instructors and administrative staff are obligated to respond within 1 day by email, snail mail or telephone providing proper guidance to successfully complete the assignment. Email and telephone inquiries are handled quickly, generally within 2 hours of the call. We encourage students to complete their work with less frustration and fewer delays by calling or e-mailing us for any concern. We attempt to provide direct interaction similar to conventional classroom training.

Security and Integrity
All students are required to do their own work. All lesson sheets and final exams are not returned to the student to discourage sharing of answers. Any fraud or deceit and the student will forfeit all fees and the appropriate agency will be notified. A random test generator will be implemented to protect the integrity of the assignment.

Student Information Personal Data Security Procedures
All information regarding the student is strict and privileged only. This information is held in secure databases and is not sold or provided to any one unless the student requests a copy or a State agency does an audit. Even during audits, we restrict confidential information unless the Agency can provide a legitimate excuse. Some of this security information and data is priority and details are not provided. Students are not provided with any passwords at this time.

Certificate of Completion
TLC will offer the student either pass/fail or a standard letter grading assignment. If TLC is not notified, the student will only receive a pass/fail notice. In order to pass your final assignment, you are required to obtain a minimum score of 70% on your assignment.

The certificate of completion will have all text in capital letters and there is a water mark of the Technical Learning College in three colors along with anti-counterfeiting security measures on the edge of the certificate. An electronic copy is assigned to the student's electronic record with issue date.

Student Assistance
The student shall contact TLC if they need help or assistance and double-check to ensure the registration page and assignment has been received and graded.

Instructions for Written Assignments
The Chlorination 202 training CEU course uses multiple choice and true/false questions. Answers may be written in this manual or typed out on a separate answer sheet. TLC prefers that students type out and e-mail their answer sheets to info@tlch2o.com, but they may be faxed to (928) 468-0675.

Grading Criteria
TLC offers students the option of either pass/fail or assignment of a standard letter grade. If a standard letter grade is not requested, a pass/fail notice will be issued. Final course grades are based on the total number of possible points. The grading scale is administered equally to all students in the course. Do not expect to receive a grade higher than that merited by your total points. No point adjustments will be made for class participation or other subjective factors. For security purposes, please fax or e-mail a copy of your driver's license and always call us to confirm we've received your assignment and to confirm your identity.

Final Examination for Credit
Opportunity to pass the final comprehensive examination is limited to three attempts per course enrollment.

Required Texts
This course comes complete and does not require any other materials.

Environmental Terms, Abbreviations, and Acronyms
TLC provides a glossary in the rear of this manual that defines, in non-technical language, commonly used environmental terms appearing in publications and materials, as well as abbreviations and acronyms used throughout the EPA and other governmental agencies.

ADA Compliance
TLC will make reasonable accommodations for persons with documented disabilities. Students should notify TLC and their instructors of any special needs. Course content may vary from this outline to meet the needs of these particular students.

Feedback Mechanism (Examination Procedures)
Each student will receive a feedback or survey form as part of his or her study packet. The student will be able to find this form in the front of the assignment or lesson(assessment). The student can e-mail, snail mail or telephone TLC for any concern at any time.

Student Concerns
Most of student/training course related concerns are generally answered within 2 hours but not more than 24 hours. TLC has three support staff administrators with computers and telephones and have excellent communication and computer skills and able to respond and track all students and obtain or submit required forms and assignments. TLC has a dedicated computer student tracking system database that is backed-up on a daily bases and this information is secured and stored at a secure offsite location in case of fire or security problems. All student website information is tracked and documented for security measures.

Recordkeeping and Reporting Practices
TLC keeps all student records for a minimum of five years. It is the student's responsibility to give the completion certificate and/or paperwork to the appropriate government agencies. If necessary, we will electronically submit the required information to any required state agency for your certification renewals.

TLC Record Storage
TLC's training records include the following elements:
1. Individual course training (assessment) and registration page (Customer Order Record) is recorded in Excel format and the hard copies are scanned and stored in a computer database for 5 years and include the following:
a. the instructor(s) who taught each session on that date the of the training session or grading was offered (in comments section registration page) as well as which instructor was considered to be the lead instructor(s) and by the Director.
b. the name of the instructor(s) and facilitator(s) who proctored and/or graded the examination for each training session if applicable (in comments section registration page);
c. the attendance sign-in sheet(s) (registration page) for each training course or session;
d. all graded and dated validated examination answer (Assessment) sheets for each examination attempt including an explanation (written in comments and/or Excel list) for any

retests as well as a narrative explaining any assistance provided to the attendee before the re-test; and
e. session evaluation(survey)forms (in comments section registration page and or Excel list).

Final Assignment
The final examination assignment is determined by the examination administrator or the instruction and there are generally three versions that are readily available. There are also three levels of the examination from average, (5 Answers) Difficult (5 +All of the above) and very difficult (Six answers and All of the above). The student is provided the average rated examination unless there is a condition or concern that requires a more difficult exanimation. Example, two or more students at the same address or any suspicion of cheating or potential fraud. We try to ensure the security and learning experience. Assignments/answer keys are only accessible to instructors and administrative staff that have a need to know clearance.

Failure
If the student fails the examination, they are provided with two more chances to successfully pass the exam with a score of 70% or better. The student may receive a different and randomly generated exam. Upon failure of an exam, the student can submit their concerns in writing or submit a survey form and has the option to receive instructor assistance that would be equivalent to conventional classroom assistance in discovering the areas that are deficient. The instructor has the option in describing the assistance method or procedure depending upon the student's deficiencies.

Grading Criteria
TLC will offer the student either pass/fail or a standard letter grading assignment.
A 900 – 1000 points
B 800 – 899 points
C 700 – 799 points
D 600 – 699 points
F <600 points

In order to successfully pass this course, you will need to have 70% on the final exam. The entire assignment is available on TLC's Website in a Word document format for your convenience.

Forfeiture of Certificate (Cheating)
If a student is found to have cheated on an examination, the penalty may include--but is not limited to--expulsion; foreclosure from future classes for a specified period; forfeiture of certificate for course/courses enrolled in at TLC; or all of the above in accordance with TLC's Student Manual. A letter notifying the student's sponsoring organization (State Agency) of the individual's misconduct will be sent by the appropriate official at TLC. No refund will be given for paid courses. An investigation of all other students that have taken the same assignment within 60-day period of the discovery will be re-examined for fraud or cheating. TLC reserves the right to revoke any published certificates and/or grades if cheating has been discovered for any reason and at any time. Students shall sign affidavit agreeing with all security measures. The student shall submit a driver's license for signature verification and track their time worked on the assignment. The student shall sign an affidavit verifying they have not cheated and worked alone on the assignment.

Proctoring Instructions
Students enrolled in Technical Learning College's CEU courses that require proctored testing and **who do not live in the physical service area** of the Technical Learning College Test Center must nominate and gain prior approval of a proctor who will monitor course tests. A new proctor nomination form is required for each term and for each class.

PROCTORS, *If Necessary…*
A proctor is an individual who agrees to receive and administer a student's test(s) from Technical Learning College at the proctor's business email address. The test(s) will be ethically and professionally administered in a suitable testing environment (e.g., college/library or professional office). The proctor will return the test(s) to the Technical Learning College Test Center via fax immediately after administration, and the proctor will mail the exam within one (1) work day of administration to the Technical Learning College Test Center.

Proctors certify in writing to the Technical Learning College Test Center that the student completed the test according to all of the specific directions provided in the proctor guidelines letter. As the Proctor Nomination Form indicates, the student will identify the specific test(s) the proctor will monitor.

Any proctor the student nominates must be acting in the official capacity in one of the following positions:

- **College or University Personnel:** Dean, Department Chair, Student Records, Professional Staff Member of an adult/continuing education office or counseling center, Librarian, Professor, or any official testing center personnel if the tests are administered in the center.
- **Armed Forces Education Office Personnel**
- **Public or Private School Personnel:** Superintendent, Principal, Guidance Counselor, or Librarian.
- **Other:** Civil Service Examiner, Librarian for City/County, HR Professional, or Education/Training Coordinator.

The following persons do not qualify as proctors:

- **Co-workers, someone who reports to you or your immediate supervisor**
- **Friends**
- **Neighbors**
- **Relatives**

Nominating a Proctor
Students are responsible for identifying, nominating, and making all of the arrangements for the proctoring of their course tests, including the payment of any fees for services and the return of test materials to Technical Learning College Test Center (cost of FAX or postage). The proctor must be able to receive the student's test(s) via email as attachments. The Technical Learning College Test Center does not accept Yahoo, AOL, G-mail, Hotmail, or etc. email addresses.

If the student is unable to find a suitable proctor, they must contact the Technical Learning College Test Center for assistance immediately via email.

Proctor Nomination Form
Students will use the Proctor Nomination Form for nomination and approval of a proctor. The student will complete the top part of the form for each course s/he is taking, even if the same proctor is used for all tests. The student must click on the submit button for the data to be electronically transmitted to the Technical Learning College Test Center.

Disclaimer Notice
It is ultimately the student's responsibility to ensure that this CEU course is either approved or accepted in my State for CEU credit. The student shall understand State laws and rules change on a frequent basis and believe this course is currently accepted in their State for CEU or contact hour credit, if it is not, the student shall will not hold Technical Learning College responsible. The student shall also understand that this type of study program deals with dangerous conditions and that the student shall will not hold Technical Learning College, Technical Learning Consultants, Inc. (TLC) liable for any errors or omissions or advice contained in this CEU education training course or for any violation or injury caused by this CEU education training course material. The student shall will call or contact TLC if help or assistance is needed and double-check to ensure the registration page and assignment has been received and graded.

Affidavit of Exam Completion
The student shall affirm that they alone completed the entire text of the course. The student shall affirm that they completed the exam without assistance from any outside source. The student shall understand that it is their sole responsibility to file or maintain their certificate of completion as required by the state.

Refund Policy
We will beat any other training competitor's price for the same CEU material or classroom training. Student satisfaction is guaranteed. We will refund course fees if the course is not accepted for credit by the State. Otherwise, any other problem will be given an exchange credit towards an acceptable or approved course for the State. Once we are notified of the refund or exchange, we will generally issue a refund in 30 days of the problem and exchange within the same day.

Note to Students
Keep a copy of everything that you submit! If your work is lost, you can submit your copy for grading. If you do not receive your certificate of completion or other results within two to three weeks after submitting it, please contact your instructor.

The student is required to submit the following information for assignment grading…

1. 70 PERCENT ON FINAL ASSESSMENT
2. DRIVER'S LICENSE
3. SCHEDULE OF TIME WORKED ON ASSIGNMENT
4. AFFIDAVIT OF EXAM COMPLETION
5. PROCTOR CERTIFICATION
6. TELEPHONE CONFIRMATION

Educational Mission

- *To provide TLC students with comprehensive and ongoing training in the theory and skills needed for the environmental education field,*

- *To provide TLC students with opportunities to apply and understand the theory and skills needed for operator certification,*

- *To provide opportunities for TLC students to learn and practice environmental educational skills with members of the community for the purpose of sharing diverse perspectives and experience,*

- *To provide a forum in which students can exchange experiences and ideas related to environmental education,*

- *To provide a forum for the collection and dissemination of current information related to environmental education, and to maintain an environment that nurtures academic and personal growth.*

When the Student finishes this course…

At the finish of this course, you (the student) should be able to explain and describe

1. Safe Drinking Water Act (SDWA).
2. Various conventional modern water/wastewater treatment disinfectants.
3. Various halogens and halides.
4. History of chlorination.
5. Waterborne diseases and viruses.
6. Chlorine gas.
7. Chlorine exposure limits, residuals and related information.
9. Sodium hypochlorite.
10. Calcium hypochlorite.
11. Chlorine-based disinfectants- Chloramines, and related oxidizers.
12. Chlorination equipment and safety requirements.
13. Chlorine health hazards.
14. Chlorine dioxide.
15. Water disinfection methods.
16. Alternative chlorination methods for water/wastewater disinfection.
17. Conventional bacteriological sampling and monitoring.

CUSTOMER SERVICE RESPONSE CARD

NAME: _____

E-MAIL_____PHONE_____

PLEASE COMPLETE THIS FORM BY CIRCLING THE NUMBER OF THE APPROPRIATE ANSWER IN THE AREA BELOW.

1. Please rate the difficulty of your course.
   Very Easy 0 1 2 3 4 5 Very Difficult

2. Please rate the difficulty of the testing process.
   Very Easy 0 1 2 3 4 5 Very Difficult

3. Please rate the subject matter on the exam to your actual field or work.
   Very Similar 0 1 2 3 4 5 Very Different

4. How did you hear about this Course? _____

5. What would you do to improve the Course?

_____

How about the price of the course?

Poor_____ Fair ____ Average ____ Good____ Great_____

How was your customer service?

Poor___ Fair ____ Average ____ Good _____ Great_____

Any other concerns or comments.
